Japan: Medical Biotechnology

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Date (10/2008)

Summary

Although Japan still lags behind the United States, and much of Europe, in the development of its biotechnology sector, the country is making considerable effort to develop biotechnology as a major industry. As a result, the Japanese biotechnology industry has been making good progress in recent years. Much of the impetus has come from the Japanese government which has been providing considerable support to foster this industry. The industry's rapid development is a visible result of the close cooperation between the Japanese public and private sectors and academia. In 2007, the total market size of the Japanese biotechnology industry was USD19.5 billion, a 10.8 percent increase over 2006. Currently medical biotechnology is the leading sub-sector. The size of the medical biotechnology market was USD5.49 billion, in 2006, about a five percent increase over 2005. The medical biotechnology market was projected to reach USD5.8 billion in 2007. Medical biotechnology products account for over 30 percent of the Japanese biotechnology market. Within medical biotechnology, therapeutic antibodies have the highest growth potential. Japanese pharmaceutical companies are eagerly seeking new drug candidates and pipelines, identified or developed by overseas biotech companies, which they can tap into in order to develop new drugs.

Market Demand

Although Japan is the world's second largest pharmaceutical market, it still lags behind the United States and much of Europe in the development of its medical biotechnology sector. However, the country is making considerable effort to grow this sector as a major industry. The Japanese government has been providing strong support to foster biotechnology development with medical biotechnology as the leading sub-sector. In March 2006, the Japanese government designated "Life Sciences" as one of four fields in science and technology that will receive prioritized allocation of national resources until 2010. The other three fields are Information and Communications; Environmental Sciences; and Nanotechnology and Materials.

The industry's rapid development is a visible result of close cooperation between the Japanese public and private sectors and academia. While the Japanese food, agricultural and IT sectors continue to expand their biotech related activities, the medical sector, especially the pharmaceutical sector, is very active in research and development (R&D), licensing and early stage drug development. The relationship between Japanese pharmaceutical companies and both Japanese and overseas emerging biotechnology companies will become closer through strategic alliances and collaborative research and development, and even mergers and acquisitions (M&A).

Within medical biotechnology, therapeutic antibodies (antibody-based drug products) have the highest growth potential. According to a report by Fuji Keizai Co. Ltd., a Japanese market research company, in 2005, the size of the market for therapeutic antibodies was USD540 million. In 2006 it was USD687 million. The report projected that the size of the market for therapeutic antibodies in 2016 would be over USD2 billion.

This Japanese push in biotechnology is also seen in the growing number of Japanese emerging biotech companies, called "biotechnology venture" companies in Japan. According to a survey by the Japan Bioindustry Association (JBA), the number of emerging biotech companies increased from 387 in 2003 to 586 in 2006. As of 2007, 17 emerging biotech companies had gone public in Japan. JBA reported that among the 586 emerging biotech companies, 32 percent of them are in the medical biotechnology field.

Japan has placed considerable emphasis on the development of stems cells. Recently Kyoto University obtained the first patent in the world, applicable only in Japan, for fundamental techniques used to create induced pluripotent stem (iPS) cells. iPS cells were first produced from mouse cells in 2006 by Professor

Shinya Yamanaka, of Kyoto University, and are a type of pluripotent stem cell artificially derived from a non-pluripotent cell, without using embryos. iPS cells have the potential to grow into any type of body tissue. The Japanese government has further plans to allocate significant funding for iPS cell research-related projects including the development of commercial applications. In December 2007, the GOJ Ministry of Education, Culture, Sports, Science and Technology announced that the Ministry would allocate about JPY 10 billion (approximately USD85 million) in support of iPS cell research between 2008 to 2012.

Market Data

According to Nikkei Bio Nenkan 2008, published by Nikkei Business Publications, in 2007 the total market size of the Japanese biotechnology industry (medical/pharmaceutical products; food and agriculture; research equipment; IT technologies; and other related products) was JPY2.3 trillion (approximately USD19.5 billion at 117.76/USD1), a 10.8 percent increase over 2006 when the market totaled JPY2.07 trillion (approximately USD17.8 billion at 116.31/USD1).

Fuji Keizai reported that in 2006, the size of the medical biotechnology market was JPY639 billion (approximately USD5,490 million at JPN116.31/USD1), which was about a five percent increase over 2005. The report projected that in 2007, the size of the market would reach JPY686 billion (approximately USD5,821 million – final 2007 figures are not available at this time). Medical biotechnology products account for over 30 percent of the Japanese biotechnology market. Detailed statistics are below.

Medical Biotechnology Market in Japan

(Unit: JPY billion and USD million)

	2004	2005	2006	2007e
Biopharmaceutical Products	JPY364 (USD3,368)	411 (3,730)	432 (3,714)	471 (3,999)
Diagnostics (1)	JPY137 (USD1,266)	143 (1,297)	147 (1,266)	151 (1,283)
Others (2)	JPY52 (USD479)	55 (504)	59 (510)	63 (539)
Total	JPY553 (USD5,113)	609 (5,530)	639 (5,490)	686 (5,821)

Sources: Fuji Keizai Co., Ltd. "2007 Bio Business Shijo"

Notes: (1) "Diagnostics" include DNA-based diagnostics and testing, monoclonal antibodies, disease risk prediction technology, etc.
(2) "Others" include biosensors, regenerative medicine and tailor-made medicines (individualized medicines), etc.
(3) The 2007 market size estimates are from Fuji Keizai.
(4) Exchange rates: 2004 – JPY 108.15=USD1; 2005 – JPY110.11=USD1; 2006 – JPY116.31=USD1; 2007 – JPY117.76=USD1 (Source: U.S. Federal Reserve)

Best Prospects

Within the biotech pharmaceuticals area, therapeutic antibodies have high growth potential. Until recently, Japanese pharmaceutical companies did not focus on therapeutic antibodies as a priority and, as a result, fell considerably behind other multinational pharmaceutical companies. Given recent market trends and market potential, however, large Japanese pharmaceutical companies such as Takeda Pharmaceutical, Daiichi Sankyo, Astellas Pharma, Kyowa Hakko Kirin, etc., have started their own research and development activities in this area. These companies are also increasingly seeking opportunities to form strategic

partnerships, research collaboration, and licensing arrangements with U.S. biotech companies and research institutes for therapeutic antibody research. Cancer and rheumatism are therapeutic fields for antibodies with major potential growth. RNAi therapeutics and molecular target-based anticancer drugs also have good potential in Japan. Although as yet there are no commercial RNAi therapeutics in the world market, a number of Japanese pharmaceutical companies, biotech companies and research institutes are involved in research and development of RNAi-related drugs.

Japan is also focusing on vaccines. The Japanese government has recognized the need for access to vaccines, for national security reasons, and also as a mechanism for holding down national healthcare costs through disease prevention. The government is encouraging the Japanese pharmaceutical industry to expand and accelerate the research and development of domestic vaccine production and to collaborate with foreign pharmaceutical and biotechnology companies that develop and manufacturer vaccines.

Biosensors, especially blood glucose monitoring systems, are another area with excellent growth prospects although the sub-sector is highly competitive. Since the number of diabetics is increasing in Japan, the market for diabetes-related medical products is expanding. According to a 2006 survey by GOJ Ministry of Health, Labour and Welfare (MHLW), the number of diabetics under medical treatment was 2.47 million persons and an additional 18.7 million persons were considered as potential diabetics.

iPS cell R&D is an area with good growth prospects for U.S. firms, however, at this time, there has been no commercialization of iPS cell-related products in Japan.

Key Suppliers

Biopharmaceutical Products

Japan is the second largest pharmaceuticals market in the world after the U.S. In 2006, imports of foreign pharmaceuticals, including biopharmaceutical products, accounted for approximately 20 percent of the total Japanese market. Taking into consideration local production by foreign firms and compounds licensed to Japanese manufacturers, the actual foreign share of the total market was closer to 40 percent. When considering the latter statistic, U.S. firms have actually achieved a market share approaching 20 percent of the total market, according to a Japan-based representative of the U.S. pharmaceutical industry.

Major Japanese suppliers of biopharmaceutical products, including recombinant drugs, therapeutic antibodies and molecular target-based anticancer drugs, are Chugai Pharmaceutical, Takeda Pharmaceutical, Daiichi Sankyo, Mitsubishi Tanabe Pharma, Eizai, and Kyowa Hakko Kirin. Major non-Japanese suppliers are Amgen (U.S.), Wyeth (U.S.), Eli Lilly (U.S.), AstraZeneca (U.K.), Novartis Pharma (Swiss) and Novo Nordisk (Denmark).

Diagnostics and Other Biomedical Products

The size of the Japanese market for all medical devices, including diagnostics and other biomedical products, was USD19.4 billion in 2006. U.S. products represented an approximately 55 percent share of total medical device imports into Japan in 2006 and accounted for 27 percent of Japan's total device market.

Major Japanese suppliers of diagnostics and other biomedical products, which include DNA-based diagnostics and testing; monoclonal antibodies; disease risk prediction technology; biosensors; regenerative medicine; and tailor-made medicines (individualized medicines) are FUJIREBIO, Samwa Kagaku Kenkyusho, Kaken Pharmaceutical, and Terumo. Major non-Japanese suppliers are Abbott (U.S.), Roche Diagnostics (Swiss), Sanofi-aventis (France) and Dako (Denmark).

Japanese Emerging Biotech Companies

In 2006, there were 586 emerging biotech companies, called "biotechnology venture" companies, in Japan. As of 2007, 17 emerging biotech companies had become public companies in Japan. Among the 17 companies, the following twelve companies were in the medical biotechnology field: AnGes MG, OncoTherapy Science, Sosei, Medical & Biological Laboratories, Effector Cell Institute(ECI), LTT Bio-Pharma,

Shin Nippon Biomedical Laboratories, Trans Genic, MediciNova, MEDINET, MediBIC and Immuno-Biological Laboratories.

Prospective Buyers

For U.S. biotechnology companies, the main biomedical buyers (and potential business partners) in Japan are the Japanese pharmaceutical companies. In order to save on R&D costs, Japanese pharmaceutical companies are eagerly seeking new drug candidates and pipelines, identified or developed by overseas biotech companies, which they can tap into in order to develop new drugs. The most targeted diseases are cancer and lifestyle-related illnesses such as diabetes, arteriosclerosis, high blood pressure and hyperlipemia. The following are the top four Japanese pharmaceutical companies in terms of domestic and international sales.

Takeda Pharmaceutical Co., Ltd.
Takeda, founded in 1781, is the largest pharmaceutical company in Japan. The company's core therapeutic areas for diseases are oncology, urology, the central nervous system, gastroenterology and lifestyle-related diseases. Takeda is expanding its biopharmaceutical businesses by actively engaging in M&A and strategic alliances. The firm acquired Millennium, a U.S. biotech company, and also Amgen's subsidiary in Japan in 2008. Additionally the company established a research center for therapeutic antibodies in San Francisco in 2007.

Astellas Pharma Inc.
Astellas Pharma was established in 2005 through a merger of Yamanouchi Pharmaceutical Co., Ltd. and Fujisawa Pharmaceutical Co., Ltd. The company is targeting oncology, urology, immunology and inflammation, diabetes, the central nervous system and pain, and infectious diseases, including viruses. Astellas is putting its efforts into expanding the company's therapeutic antibody product lines and is actively seeking potential business partners in the U.S. Astellas acquired Agensys Inc., (a California-based firm) in 2007.

Daiichi Sankyo Co., Ltd.
Daiichi Pharmaceutical Co., Ltd. and Sankyo Co., Ltd. merged in 2005 to become Daiichi Sankyo Co., Ltd. The company's core therapeutic areas are cardiovascular and glucose metabolic-related diseases. Daiichi Sankyo is expanding its product lines through licensing with overseas biotech companies. In 2007, Daiichi Sankyo entered into a collaboration and licensing agreement with Amgen for the development and commercialization of Denosumab in Japan. Denosumab is a fully human monoclonal antibody and has the potential to treat and prevent a broad range of bone loss conditions including osteoporosis.

Eizai Co., Ltd.
Eizai was founded in 1941. The company's core therapeutic areas are neurology and gastroenterology. Eizai is strong in low-molecular weight drugs, however, the company is currently placing strong focus on the development of antibodies. In 2007, Eizai acquired Morphotek Inc., a U.S. biotech company that specializes in antibody R&D. Eizai is now accelerating its research activities into antibodies that treatment cancer, rheumatoid arthritis, and infections, using Morphotek's technologies.

Market Entry

Although many Japanese companies act as agents and distributors for foreign biomedical products, currently Japanese companies appear to prefer a more integrated relationship with foreign firms. Japanese pharmaceutical companies are seeking opportunities to conduct R&D and license technology from U.S. firms. These companies are eagerly looking for new lead compounds and early stage drugs developed by U.S. biotech companies. The Japanese pharmaceutical companies collect such information from their U.S. offices, consultants in Japan and the United States or by attending biotech trade and partnering events, such as the

BIO International Convention in the United States or BioJapan, Bio Expo, and the BIO-Asia partnering conference in Japan. These companies are very open to working with U.S. biotechnology companies.

For U.S. non-pharmaceutical medical biotechnology companies, it is also important to find a Japanese business partner for collaborative research or licensing, in addition to traditional distributorship business arrangements. Identifying the right partner is crucial. Participation in and exposure through trade shows, partnering events and academic conferences provides excellent opportunities to make contacts.

Market Access Issues & Obstacles

U.S. biotech companies must be mindful of various Japanese government regulations as they consider exporting their biomedical products to Japan. Drugs and devices are governed by the MHLW. There was a significant change in the Japanese Pharmaceutical Affairs Law (PAL) in April 2005. Under the new PAL, a company in Japan that intends to market imported drugs and medical devices needs to receive a "license for manufacturing/marketing business" ("*seizo hanbaigyo kyoka"*). The principal reason for the PAL revision was to shift the foundation of the regulatory system from the point of manufacturing to the point of sale in order to place more importance on post marketing safety measures. Every imported product needs an "approval" ("*shonin*") from MHLW, except devices that are classified as general medical devices, which only require registration. The Pharmaceutical and Medical Devices Agency (PMDA) conducts the actual examinations for these approvals. In addition, there are other regulations for biopharmaceuticals with special focus on ingredient safety and quality, manufacturing methods, and examination and evaluation methodologies. Information on regulations for biopharmaceutical products can be obtained from the following website (Japanese language only): http://www.nibio.go.jp/guide/top.html.

For more information on the Pharmaceutical Affairs Law and Japanese pharmaceutical regulations in English, please visit the following websites: http://www5.cao.go.jp/otodb/english/houseido/hou/lh_02070.html, http://www.jpma.or.jp/english/parj/pdf/2008.pdf.

Trade Events

Event: BIO-Asia Partnering Conference 2009
Date: January 19-20, 2009
Location: Grand Hyatt Tokyo
Organizer: Biotechnology Industry Organization (BIO)
Website: http://www.bio.org/bioasia

Event: Drug Discovery and Development of Innovative Therapeutics Japan
Dates: June 1-3, 2009
Location: Keio Plaza Hotel Shinjuku
Organizer: IBC Life Sciences
Website: http://www.IBCLifeSciences.com/Japan

Event: International Bio Expo Japan
Date: July 1-3, 2009
Location: Tokyo Big Sight
Organizer: Reed Exhibitions
Website: http://www.bio-expo.jp

Event: BioJapan 2009 World Business Forum
Date: October 7-9, 2009
Location: Pacifico Yokohama
Organizer: BioJapan Organizing Committee/Nikkei Business Publications, Inc.
Website: http://expo.nikkeibp.co.jp/biojapan

References & Key Contacts

Japanese Government Agencies

Ministry of Health, Labor and Welfare (MHLW)
http://www.mhlw.go.jp/english/index.html

Ministry of Agriculture, Forestry and Fisheries (MAFF)
http://www.maff.go.jp/eindex.html

Pharmaceutical and Medical Devices Agency (PMDA)
http://www.pmda.go.jp/index-e.html

National Research Institutes

National Institute of Biomedical Innovation
http://www.nibio.go.jp/english/

National Institute of Health Sciences
http://www.nihs.go.jp/english/index.html

National Institute of Infectious Diseases
http://www.nih.go.jp/niid/index-e.html

Trade Organizations and Academic Societies

Japan Pharmaceutical Manufacturers Association (JPMA)
http://www.jpma.or.jp/english/

Japan Biotechnology Association (JBA)
http://www.jba.or.jp/english/index.html

The Pharmaceutical Society of Japan
http://www.pharm.or.jp/index_e.html

Molecular Biology Society of Japan
http://wwwsoc.nii.ac.jp/mbsj/en/index.html

For More Information

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